Increasing Project Success in Wellhead and Christmas Tree Manufacturing Equipment Through Risk Management Culture

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Abstract. The primary equipment for oil production, manufactured in a plant, is the wellhead and Christmas tree. By creating a standardized set of risk instruments and a risk management framework, embedding risk management into organizational culture will reduce the overhead of imposing risk management on every new manufacturing project. This study's goal is to improve project success by examining the culture of risk management practices in the production of wellhead and Christmas tree equipment. The information was gathered from companies in Malaysia and Batam, Indonesia, with 161 respondents in a population study. Employing Cronbach's alpha to analyze the descriptive data and determine its significance. The Cronbach alpha and significant value are displayed consequently. The study's data came from a post-survey and survey using a Google link form of companies with stock listed in Malaysia and Batam, Indonesia. These results show that risk culture and staff competency may be created as important variables to improve risk management implementation in manufacturing, based on descriptive statistical analysis. This paper shows how to create a multicultural project management process and raise project success rates by adhering to this approach.

1 Introduction

The necessary wellhead and Christmas tree equipment must be kept up, according to the manufacturer or organizers. They should pick capable individuals who are knowledgeable about good operations and up to speed on the most recent well status. Good communication between all stakeholders is necessary to ensure that the project team, manufacturing team, and client sales representatives are all given the correct information [1, 2]

To maintain the necessary safety levels in offshore operations to represent the goods made during the manufacturing processes, effective procedures and organizational solutions should be put in place [3]. The Petroleum and Gas (Production and Safety) Regulations apply to all wellhead and Christmas tree equipment [4]. Any wellheads or petroleum equipment that does not meet the required standards must be reported to the Inspectorate, and suitable steps must be made to comply with the regulation.

A sound planning and risk management strategy is necessary to satisfy the objectives of the manufacturing project and deliverables [5] should be put into place before starting the manufacturing process. The model should comprise all work activities, engineering design jobs, estimate and cost control sheets, project schedule and time sheets, and pertinent record sheets [6] for the duration required to properly finish the project, in a communication loop with clients, internal organizational teams, and vendors/contractors.

One of the factors that might improve performance and help the organization achieve its goals is the attention that senior management places on risk management implementation [7]. Risk culture and the hiring of individuals with personalities who are eager to give knowledge, competency, and motivation were the two fundamental notions from which this component was established [8]. The following subtopic of wellhead and Christmas tree equipment develops the constructs of risk management implementation.

2 Literature review

Safety, health, and environmental issues are related to the inherent danger that manufacturing companies provide to their employees, the communities they serve, and the environment (SHE) risks [9]. Despite the incorporation of SHE and financial risk management as a key component of day-to-day business operations, all industrial firms confront significant hurdles when SHE risks materializing into actual loss-causing occurrences. Such occurrences

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The corporate climate is constantly changing [10]. Major initiatives, many of which involve great risk, have accelerated the advancement of science and engineering. As a result, it is crucial to incorporate a risk management strategy [8]. Manufacturing projects can easily spiral out of control, use many additional resources, significantly increase project costs, and even collapse if proper risk assessment and risk management are not implemented. claims that the process of comprehending the nature of uncertainty is what is meant by risk management [11] future occurrences and creating constructive preparations to either mitigate any hazards they may provide or to seize any opportunities they may present. A systematic approach to risk management is thought to improve an organization's capacity to handle risk at all stages.

According to by [10], risk is a risk element that can affect the progress and workflow of a manufacturing project [12]. Bedny and Meister [13] defined risk as a function of the potential for loss linked with a specific activity, process, or situation.

Another researcher defined risk as exposure to or the likelihood of experiencing losses or other events [14]. Described risk as an unfavorable element that affects the outcome of any scenario in which it exists. The word "risk" in its general use connotes a disapproving attitude toward the environment in issue.

A risk can be a major impediment to success [15]. Learn how to handle risks by employing one of three major strategies: control, eradication, or avoidance. Outcome expectations, outcome possibilities, and outcome uncertainty are other terms for these risk indicators. When taken out of context, risk can refer to the identification of a developing or current risk.

The process of recognizing possible problems under risk management [16] establishes a strategy for controlling or enhancing the situation after determining the potential effects of the problems within an acceptable range of circumstances [17].

The process of identifying the issues is referred to as risk assessment. The process of deciding what to do about the issues is known as risk management. Hazard identification, dose-response assessment, exposure assessment, and risk characterization are the four phases that makeup risk assessment [18].

The results of the industry study demonstrated that the primary categories of needs and functionality (both specialized and generic) were where failure modes originated. These served as a general framework from which more specialized failure modes might be derived [19].

The creation of a product involves several processes, beginning with the ideation of goals and concepts and concluding with the actualization, production, and installation of the finished product for the consumer. The needs of various businesses will vary, which will have an impact on how products are designed and made. Some businesses specify and adhere to specific, thorough processes [20].

Any business that transforms raw materials into marketable products through an assembly process involving machinery, equipment, manual labor, quality control, and inspections is referred to as a manufacturing operation. Wellheads and Christmas tree equipment are examples of petroleum oil and gas equipment that is manufactured in a plant. Following tender and sales orders, the company produced the equipment in accordance with the client's needs in terms of lead time, lead considerations, and technical criteria. Leading the manufacturing project, project management is responsible for ensuring that the equipment is delivered in accordance with the customer's specifications as mentioned in the sales order and tender.

Even though a few manufacturing projects were actively attempting to address risks and opportunities, there was no standard and unified model in place, and there was little commitment to risk management implementation [21].

Wellheads are the primary piece of equipment utilized in the production of oil. They are produced at the facility and installed on the casing head to close the opening between the casing and tubing, enabling the transportation of oil through pipelines. It is frequently made of cast or forged steel and machined to a precise fit in order to create a seal and prevent well fluids from blowing or leaking at the surface. The wellhead, which serves as a structural and pressure-containment interface for the drilling and production equipment, is one of the surface components of an oil or gas well [22]. Organizations must make sure the wellhead is maintained properly. This involves ensuring that those handling well operations have the necessary skills and are knowledgeable about the most recent well status.

The flow from a well is directed to specific operations such as acid fracture, water injection, and testing using a set of valves, flanges, crosspieces, tees, and chokes. The Christmas trees have both manually and automatically operated valves. In an emergency, the actuated valves (upper master and/or wing) close automatically to stop the flow of well fluids and separate the reservoir from the ensuing topside facilities. The manual valves (lower master and service wing) offer enough separation for good intervention, operations, or maintenance tasks. The top master and wing valves are critical safety components because, in an emergency, they immediately open to limit the effects of a hydrocarbon spill. Aman et al. [9] proposed that if workers were aware of, SHE hazards, they would be able to foster a risk-aware culture. This understanding guides their risk attitudes, which motivates

people to make wise decisions. These goals should be met through the development of employee training programs. As suggested by Ahmady et al. [23], an effective and long-lasting risk culture can be developed when there is agreement on an appropriate organizational risk culture, behaviors and processes that support this agreed-upon RC and clear-cut accountable leadership. These elements should be combined with uniformity, simplification, and the understanding that SHE is ultimately the responsibility of line management or operations.

The biggest barrier to efficient knowledge management is organizational culture [24]. Faster decision-making is possible in organizations with flatter hierarchies, and knowledge sharing between individuals and units within the company is typically not as constrained by bureaucracy. Therefore, the effectiveness of knowledge management should be favorably correlated with an organizational structure that has fewer degrees of hierarchy. Organizational cultures should understand that critical knowledge may be a human capacity that cannot be mechanically recorded and communicated, rather than continuing to regard knowledge as an item apart from human aspects [24].

The social, technological, and human facets of a business are all involved in knowledge management. Implementing successful knowledge management processes requires the dedication of the senior leadership team, a positive culture that supports change, and knowledge management skills [25].

Mad Sahar [17] emphasized that in addition to creating knowledge infrastructure and making knowledge management visible [26], the most difficult problems in the knowledge management process are addressing cultural change and raising the intensity of knowledge.

It was emphasized that a knowledge-creating culture increases employee motivation and loyalty [27], removing the need for onerous bureaucracy while still providing structure and control to the company. Because it serves as the focal point from which management can influence views of commitment, motivation, morale, and satisfaction, the organizational risk management culture is critical for organizational success and gaining competitive advantages. The ability to build knowledge management-driven companies is essential in knowledge-based economies [28], It can be accomplished through mentoring, online learning, or a combination of blended learning and training.

Risk management is the practice of dealing with all opportunities and risks that arise because of the business process along the value creation chain to avoid or mitigate risks. The primary goal of risk management is to ensure the business's survival. Risks cannot be completely eliminated due to the inherent hazards of being an entrepreneur. The ability to control risk, on the other hand, must be determined. To address this challenge, risk management must be aligned with the company's goals and integrated into all business operations [29].

Because they have an impact on the financial health of organizations, businesses, industries with which they are associated, and the manufacturing sector, organizational culture and risk management culture are crucial. The risk culture of an organization or firm, along with the founder's personality and preferences, are historical elements that influence how it is designed. In large firms, the management style serves as a representation of the founder. One of the factors that might improve performance and help the organization achieve its goals is the attention that senior management places on risk management implementation. The risk culture and the hiring of individuals with personalities who are eager to give knowledge, competency, and motivation served as the foundation for the development of this component. In the following subtopic, the constructs of risk management implementation are developed.

The cultural project management procedure is the last idea. To increase project success, the author broadens the definition of project management processes and adapts them. It is important to determine the project's success and the variables influencing its success rate. Management practices used in the production of Christmas trees and wellheads.

3 Method

To monitor industry results following the adoption of the new risk management strategy, this research project uses a survey and a field study, followed by data collection and analysis. Data primers included data from manufacturing reports. An organizational member/project manager, staff, and stakeholders all received questionnaires. A survey is a quantitative method in risk management, whereas a field study is a qualitative one. Identification and management of its causes enable the risk management now used in the sector. The research methodologies fall within the qualitative and quantitative general inquiry approaches. The qualitative method entails gathering a large amount of narrative data to gain an understanding of relevant occurrences. Historical and qualitative investigations are part of the qualitative approach. Historical. The quantitative method focuses on gathering numerical data to understand, forecast, and/or manage interesting occurrences. The scientific method [30] comprises experimental, descriptive, correlational, and casual-comparative research. An experiment study tracks the risk connected to project innovation equipment and looks into the cause-and-effect link in a control. Descriptive research outlines the present circumstances. The relationship between variables with quantifiable effects is described through a correlation study. Methods and analyses are selected based on their criteria, the justification for the methods and analyses, and whether a certain theoretical framework or body of literature may be tied to a particular research challenge or its objectives [31].

Surveys were given to managers, project managers/leaders, engineers, supervisors, and lead technicians to gauge how much they believed certain variable elements to have on the execution of risk management. The field study involves visiting numerous factories in Malaysia and Batam to observe the production of Christmas tree and wellhead equipment. In order to improve the major risk management variable components of corporate risk management culture, a questionnaire was

created based on the body of current research and manufacturing specialists' practitioners. The checklist of a questionnaire collects additional data for the creation and application of risk management techniques [32]. The findings of the literature review, survey, and field study were incorporated into risk management strategies and put into practice throughout the equipment's manufacturing.

Employees who worked in the industry were the study's target audience. This comprised businesses that manufactured personal protective equipment, oil and gas industry equipment, pipe connections that supported primary wellheads and valves, and producers of accessories for Batam and Malaysian oil drilling enterprises. According to Stojanovic et al. [27], the minimum sample size is 161 (S = 161).

Literature was used to establish the study framework's constructs that are pertinent to risk management culture and can affect how risk management is implemented and shown in Fig. 1. The performance of the company and its reaction to the idea of risk management implementation were taken into consideration when developing the constructs. Performance results promote an organization's commitment to implementing the risk management process by allowing it to concentrate on how much risk management is necessary.

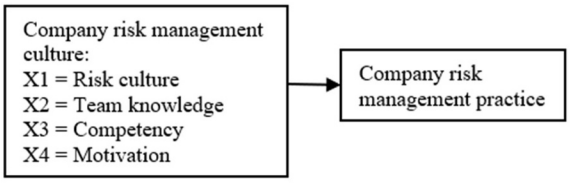

Fig. 1. The theoretical foundation for a company's risk management culture and its application to practice.

4 Results and discussions

SPSS was used to analyze the pilot study's findings. Each questionnaire construct had an individual score that varied from 0.705 to 0.826. All of the constructs were determined to be trustworthy based on these tests, and additional study did not call for any modifications.

The coefficient of the independent variable results (X) is substantially different from zero, according to a test (p-value 14 0.00). The "company risk management implementation stage" appears to vary by 26.7%, according to the R2 of 0.267, which can be attributed to variations in corporate risk management culture (Table 1). The model also shows a favorable correlation between organizational effectiveness of risk management implementation and corporate risk management culture.

Table 1. Analysis of the regression test for the risk management practices and corporate culture.

Variable	B value	P
Constant	12.297	0.000
Culture (n = 5)	0.134	0.042*
Project team knowledge (n = 5)	0.174	0.040*
Competency (n = 5)	0.340	0.000*
Motivation (n = 5)	0.197	0.017*
N = 161		
R^2 = 0.267		
**Significant at P < 0.05*		

The research findings and analysis revealed that the regression analysis model accurately predicted every variable component associated with the use of SPSS software to perform risk management. These variable characteristics, including risk management expertise, motivation, and risk culture, can have an impact on how well a business implements risk management.

The goal was to identify elements or variables that could affect how the risk management method was applied when producing wellhead and Christmas tree equipment. Analysis has shown that every element or variable in the corporate risk management culture has an impact on how risk management is applied in the sector. According to the results, competency is the main factor influencing the application of risk management. Motivation, team expertise, and risk culture are listed after that. All demographic variables investigated in this study were shown to be significant and connected to the path model.

5 Conclusion

By examining the connection between successful risk management practices and organizational risk management culture, this study contributes to the field of risk management research. The findings highlight a few organizational and behavioral variables that can influence risk management implementation in the manufacturing area, including competency, knowledge management, motivation, and risk culture.

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